



PATENT APPLICATION

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the application of:

Attorney Docket No.: 1550.36US02

Seghatol

Confirmation No.: 1736

Application No.: 09/897,317

Examiner: Ralph A. Lewis

Filed: July 2, 2001

Group Art Unit: 3732

For: HAND-HELD MICROWAVE INTRA-ORAL DENTAL SYSTEM

APPELLANT'S REPLY BRIEF (37 CFR § 1.192)

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Sir:

Please enter this appeal reply brief in the above-referenced application.

I. REPLY TO EXAMINER'S ANSWER ON 35 U.S.C. 102(b) REJECTION

A. U.S. PATENT NO. 5,421,727 DOES NOT DISCLOSE AN ANTENNA CONFIGURED TO BE ADJACENT AT LEAST ONE EXTERIOR SURFACE OF A TOOTH

Claim 1 of the present invention requires "an **antenna** positioned at a distal end of the tool and configured to be selectively positioned within a mouth of a patient **adjacent at least one exterior surface of a tooth.**"

In the Answer, it is argued that "the Stevens et al positioning of the antenna 422 in a root canal meets the 'adjacent' limitation since a *root canal* is 'adjacent' the tooth's exterior." (Answer, pg. 4). Under the normal and usual definition of 'adjacent' as next to or sharing a

common boundary, it is respectfully submitted that the interior surface of the drill hole inside a tooth created as part of a root canal procedure cannot fairly be said to be within the normal and intended usage of the scope of the phrase “*adjacent at least one exterior surface of a tooth*” as described and used within the present invention. It is clear from the discussion throughout the patent application that the intention and advantages of the present invention are derived from the fact that the present invention avoids the need for drilling or other removal of dentin in order to access and treat a carious lesion. This is accomplished by externally positioning of the antenna of the dental tool next to and sharing a common boundary with an *exterior* surface of the tooth. Plainly, the teaching of Stevens et al. is directed to the internal application of the antenna 422 within a hole created on the *interior* of a tooth. While the antenna 422 crosses a hole created in the exterior surface to provide access to the interior of the tooth, it cannot fairly be said that this amounts to positioning the antenna 422 “adjacent at least one exterior surface of a tooth.”

The need for such a strained and overextended interpretation of the teaching of Stevens et al. is recognized in the Answer which states that “the Examiner has made a factual finding that the Stevens et al antenna 422 is capable of being positioned adjacent an exterior surface of a patient’s tooth.” (Answer, pg. 4). The implication of this factual finding is that the antenna element 422 is not shown in Stevens et al to be positioned “adjacent an exterior surface of a patient’s tooth”; rather, the argument advanced in the Answer is essentially that one skilled in the art would have recognized that the positioning of antenna 422 or element 10 could have been at a location other than as shown in Figs. 2 and 3. There are three problems with this purported factual finding.

First, it is not supported anywhere within Stevens et al. and, as discussed above, runs counter to the actual teaching and disclosure of Stevens et al. as a tool for use in connection with a root canal. If the antenna of Stevens et al. is being used to heat a liquid disinfectant placed in the root canal, there is no reason to even consider placing the antenna element 422 at any location other than into the root canal as shown and described in Figs. 2 and 3.

Second, as discussed in the Appeal Brief, the entire antenna configuration of Stevens et al. consists of two parts, a first electrode of the antenna that inserted into the drill hole in the interior of the tooth (element 422 as shown in Fig. 5, or element 10 as shown in Figs. 2 and 3) *and* a second electrode of the antenna 42 which is shown as positioned outside the check in Fig. 2 or on the base of the gums in Fig. 3. Without the second electrode of the antenna 42, the entire “antenna” is not operational. Clearly, there is nothing in Stevens et al. that shows placement of the second electrode of the antenna (element 42) in a position that could even remotely be said to be “adjacent an exterior surface of a patient’s tooth.”

Third, the positioning of the antenna element 422 of Stevens et al. at any location other than within the root canal would decrease the effectiveness or, more likely, render ineffective the operation of endodontic instrument described by Stevens et al. Assuming, *arguendo*, that there was a motivation or teaching in Stevens et al. consistent with the purported factual finding set forth in the Answer, the positioning of the first electrode (422 or 10) on an exterior surface of the tooth will significantly alter the distribution of RF energy and, consequently, the intended effect of the endodontic instrument. Depending upon where on the exterior surface the first electrode is positioned, the portion of the RF energy going through the tooth is reduced or, in the case of Fig. 2, eliminated altogether.

**B. U.S. PATENT NO. 5,421,727 DOES NOT DISCLOSE AN ANTENNA
POSITIONED AT A DISTAL END OF A TOOL**

Claim 1 of the present invention requires “an **antenna positioned at a distal end of the tool** and configured to be selectively positioned within a mouth of a patient adjacent at least one exterior surface of a tooth.”

Contrary to the position set forth in the Answer that the “manner in which the applicant intends for the claimed device to be used fails to impose any objectively ascertainable structural distinctions from the device disclosed in Stevens et al.” (Answer, pg. 4), it is respectfully submitted that claim 1 of the present invention requires the antenna to be “*positioned at a distal end of the tool.*” As discussed above, the “antenna” of Stevens et al. includes two parts, a first electrode (element 10 or 422) shown disposed in the root canal, and a second electrode (element 42) shown outside the cheek or gums of the patient. In contrast, the present invention as claimed in claim 1 requires the antenna to be on the distal end of the tool. By effectively ignoring the fact that the “antenna” of Stevens et al. includes two parts and concentrating only on that portion of the “antenna” that is located at a distal end of a tool, the Answer glosses over the very significant *structural* differences between the “antenna” in Stevens et al. and the “antenna” of the present invention. Clearly, the second electrode 42 of Stevens et al. is not part of the handle 18 that has a tapered distal end 22. As such, there are significant structural differences in the “antenna” as claimed by the present invention that are simply not met by the teaching of Stevens et al.

C. **U.S. PATENT NO. 5,421,727 DOES NOT DISCLOSE PREFERENTIAL HEATING OF CARIES**

Claim 1 of the present invention requires “the microwave energy is applied **at a frequency and power to preferentially heat caries.**”

The argument set forth in the Answer essentially stands for the proposition that because microwave energy warms tooth tissue materials by vibration, that Stevens et al. meets this limitation of the claim language. “The Examiner had made the factual finding that since the Stevens et al tool is capable of delivering microwaves at a power and frequency level that is capable of warming surrounding tissue regions, killing tissues, raising the temperature of surrounding tooth material and glazing tooth structure, then it absolutely must be capable of heating caries.” (Answer, pg. 5).

The Applicant does not attempt to dispute the scientific basis for warming of materials by vibration as a result of the absorption of microwave energy. It is respectfully submitted, however, that the instant limitation in the claimed invention is not just about “heating caries.” Rather, the limitation of claim 1 requires that the energy be applied “*at a frequency and power to preferentially heat caries.*” As discussed in the specification at page 6, lines 3-29, both carious tissue and dental polymers respond differently to microwave energy than normal dental tissue. The present invention is the first to recognize and make use of this difference in the design and operation of a dental tool by *preferentially* heating caries. The intended consequence of such preferential application of microwave energy is the opposite of the overall goal of warming tissue as described in Stevens et al. In the present invention, the target tissue for the microwave energy is the carious tissue. While some microwave energy will be transferred to surrounding

normal dental tissue, along with some thermal energy from the heated carious tissue, the preference of the present invention is not to significantly heat or warm normal dental tissue. This preference minimizes damage to healthy dental tissue and should also reduce any incidence of pain or discomfort associated with the procedure.

In the case of Stevens et al., the endodontic tool is being used as part of a root canal procedure performed while under anesthetic on a tooth for which the root and blood vessel structure has been removed. As such, there is no significant concern for damage to healthy dental tissue and for the need to reduce any incidence of pain or discomfort associated with the procedure.

Because Stevens et al. does not contain every element of Claim 1 of the present invention, Stevens et al. does not anticipate the claim. Specifically, Stevens et al. does not contain a device having an antenna positioned at a distal end of the tool and configured to be selectively positioned adjacent at least one exterior surface of a tooth. Furthermore, Stevens et al. does not include a system wherein the microwave energy is applied by a control system at a calculated frequency and power to preferentially heat caries. As such, it is respectfully submitted that the Examiner's rejection under 35 U.S.C. § 102(b) must be reversed and Claim 1 be accordingly allowed.

REPLY TO EXAMINER'S ANSWER ON 35 U.S.C. 103 REJECTION

A. SUPPORT FOR THE CLAIMED RANGES

In arguing that claims 2-5 and 14 should be rejected under 35 U.S.C. § 103(a) as being obvious in view of Stevens et al., the Answer asserts that “one of ordinary skill in the art would have found it obvious to have selected operating parameters within the ranges claimed so that [the device] could have performed the variety of desired functions disclosed by Stevens et al.” (Answer, pg. 6). The Answer goes on to claim that “there is no showing that somehow the claimed ranges have a particular heating effect on carries and not other very similar mouth tissues . . .” (Answer, pg. 7).

It is respectfully submitted that the discussion in the specification at page 6, lines 3-29 provides very specific evidence about the intended heating effect of specific ranges on caries and polymer materials and composites and how these materials respond differently than normal healthy dental tissue.

Applicant notes that the Examiner has correctly pointed out that the detailed claim ranges of frequencies between 14 GHz to 24 GHz as identified at page 4, lines 26+ and set forth in dependent claim 5 are for polymer materials and composites. Although caries and polymer materials and composites have frequency responses that are both similar and also different from normal healthy dental tissue, the specific preferred frequency ranges identified in the specification for treatment of caries should be 12 GHz to 25 GHz as set forth in the specification at page 6, line 10. Accordingly, Applicant is willing to either cancel dependent claim 5 or amend dependent claim 5 to the properly supported range of 12 GHz to 25 GHz.

Support for the other claimed ranges as applied to treatment of caries, including operation at less than 10 W and at voltages between 10V and 65 V and frequencies between 1 GHz to 50 GHz, can be found in the detailed discussion of the preferred embodiment of the dental hand tool for heating caries associated with the electronic circuit diagram of Figure 14 at page 7 of the specification.

B. THERE IS NO SUGGESTION OR MOTIVATION TO MODIFY STEVENS ET AL.

The mere fact that a reference can be modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination. In re Mills, 916 F.2d 680 (Fed. Cir. 1990); MPEP § 2143.01. Although a prior art device “may be capable of being modified to run the way the apparatus is claimed, there must a suggestion or motivation in the reference to do so. In re Fritch, 972 F.2d 1260 (Fed. Cir. 1992).

Only with the hindsight afforded by the teaching of the present invention is there any motivation to make the modifications suggested in the Answer. The disclosed purpose and target of the application of microwave energy in Stevens et al. is the disinfectant liquid introduced into the root canal or a meltable material that would glaze a tooth structure. None of these applications require the use of microwave energy at frequencies that are preferentially targeted to heat caries. The expressed goal of the adjustments in Stevens et al. is for “maximizing power transfer to the particular load.” Without the hindsight and teaching of the present invention that the ‘particular load’ should be caries, rather than a liquid disinfectant or meltable material, there is simply no motivation and suggestion to arrive at the claimed ranges.

The Answer fails to provide any suggestion or motivation, either in the reference itself or in the knowledge generally available to one of ordinary skill in the art, to modify Stevens et al. so as to arrive at the claimed limitations. Because the Answer relies solely on Stevens et al. and no additional patents have been cited to combine with Stevens et al., the Examiner has failed to prove a *prima facie* case of obviousness. Thus, the entire rejection for obviousness must fall.

II. CONCLUSION

The primary and only reference relied upon in rejecting the claims at issue in the present invention is U.S. Patent No. 5,421,727, Stevens et al. However, Stevens et al. has a major flaw as a prior art reference – it does not contain all of the elements of the claims at issue. Therefore, a rejection under 35 U.S.C. § 102(b) is especially inappropriate. Moreover, because the Examiner has failed to establish a *prima facie* case of obviousness for numerous reasons, a rejection under 35 U.S.C. § 103(a) is also misplaced. As a result, it is respectfully submitted that the Examiner's rejections of Claims 1-6, 13, 14, and 16 of the present Application are reversed.

Respectfully submitted,

A handwritten signature in black ink, appearing to read 'BP', with a long horizontal line extending to the right.

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AF/3732

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Reply Brief
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1/16/04

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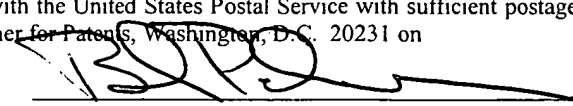
Sir:

Transmitted herewith in triplicate is Appellant's Reply Brief in this application with respect to the Examiner's Answer mailed November 4, 2003.

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